

**IMPACT OF FIELD-TRIP STRATEGY ON PERFORMANCE IN
ECOLOGY AMONG SECONDARY SCHOOL BIOLOGY STUDENTS
IN KATSINA STATE, NIGERIA**

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ABSTRACT

This study investigated the Impact of the Field-Trip Strategy on Performance in Ecology among Secondary Biology Students in Katsina State, Nigeria. Two objectives, two research questions, and two null hypotheses were used for the study. The study employed a quasi-experimental design involving pretest, posttest, experimental, and control groups as described by Kerlinger (1973). The population comprises SS II students from the nine schools. The total number of SS II students is one thousand one hundred and sixty-four (1,164) comprising seven hundred and ninety-two (792) males and three hundred and seventy-two (372) females. Out of the nine schools, two schools were randomly selected and labeled Experimental and Control Groups. The Experimental Group (EG) was exposed to field-trip strategy and comprised 134 students while the Control Group (CG) were taught ecology concept using the lecture method and had 78 students, bringing the total sample to 345. The instrument used for data collection is Ecology Performance Test (EPT). The instrument was validated by experts in the Department of Science Education, Ahmadu Bello University Zaria. The instruments were pilot tested. The reliability of the instrument was 0.72. Findings revealed among others that a significant difference exists among students taught ecology concepts using field-trip when compared to those taught using the lecture method. It was, therefore, recommended that biology teachers in secondary schools in Katsina State, Nigeria, should be encouraged through sponsorship to attend seminars, and workshops and if possible sponsored for further studies on how to effectively utilize field-trip strategy.

1.0 INTRODUCTION

Science is a branch of knowledge that is concerned with the observation and classification of facts and formulation of general truth. Science suggests ideas and technology operationalizes them (Anaeto, et al., 2016). Science clarifies and justifies how an objective may be achieved. Ecology is the study of the relationships of organisms or groups of organisms and the environment, or the science of the interrelationship among living organisms and the environment. Ecology is concerned with the biology of groups of organisms with functional processes on land, oceans, and freshwater (Eromosele & Ekholuenetale, 2016). The teaching of ecology concept at the secondary school level is necessary because it improves students' understanding of the ecosystem. The ecology concepts taught at the secondary school level include the following: habitat, population, ecosystem, succession, adaptation, conservation, pollution, cycling material, biological control, community, biotic interaction, soil studies erosion, ecology and disease, sewage disposal, ecological study, feeding relationship, energy, environment to mention just a few. An outdoor strategy that involves taking the students to a natural setting seems to have advantages in the teaching and learning of ecology in many ways, among which include;

- a) Provides a good setting to study organisms in the natural environment.
- b) Enables teachers to teach for the acquisition of scientific skills which is a major goal of science education.

Field-trip instructional strategy is taking students outside the classroom for the purpose of making relevant observations so as to obtain specific information. It could be in a nearby school farm, national park, zoo, industry, forest, or the game reserve. It is an important component of science teaching (Gomez, 2015). According to Ahmad (2014), Field-trip is an outdoor type of laboratory activity or field-work or learning exercise undertaken by teachers and students in certain aspects of a subject, to give students the opportunity to acquire knowledge. Field-trip is taking students out of the classroom to places where students can see concrete illustrations of classroom theories, which gives direct observation and interpretation of living organisms in relation to the natural environment. Field-trip on the spot requires the use of basic scientific skills which include; observation, identification, classification and manipulation of organisms in the natural surroundings. Field-trip provides real-life context for the material being learned. It can make more sense and be remembered easily if students actually participated fully. Each student observes natural settings and creates personally relevant meaning to the experience. Students interact, play with concepts, assimilate and accommodate new understanding and cognition; these are activities often not possible in the classroom.

2.0 THEORETICAL FRAMEWORK

The theoretical basis for field-trip instructional strategy is Piaget's (1952) developmental theory of learning and thinking. Piaget's developmental theory explains that the child should be able to explore his environment for effective learning. Therefore, this study employs the use of a field-trip strategy because, in a constructivist classroom, learners are actively involved, the environment is democratic, and the activities are interactive and student-centered. Field trip extends the teaching-learning processes outside the classroom and brings the students to direct contact with real-life objects, phenomenon, and events in a natural setting (Igwebuiké & Atomatofa, 2013; Lakshmi, Rao & Rao, 2010 & Zoldosova & Prokop, 2006). The argument for use of field trips draws its strength from the constructivist school of

educational thought who maintains that, for meaningful learning to take place, learners have to build their own learning and knowledge from personal experience. This means that self-constructed knowledge and sense-making cannot take place if the teacher assumes the role of a custodian of the knowledge. Rather, effective learning takes place better in such an interactive forum like field trip (Igwebuike, 2013). Apart from the fact that field trip promotes students' interest in a subject, the strategy aids interaction, prompts discussion, satisfies students' natural curiosity, and eliminates boredom that characterizes the chalk and talk method.

3.0 STATEMENT OF THE PROBLEM

The poor performance of students in biology has become a concern in science education. Many students find it very difficult to pass biology at credit level in both internal and external examinations. The reason for these difficulties may vary but could be related to the teaching method being used to explain such biology concepts (Okogu, Osah & Umudjere, 2016). To corroborate the above findings, Ihejiamazu and Ochui (2016) asserted that, the issue of poor performance in biology examinations was due to the problem of teaching methods. This may not be unconnected with the teaching method used by teachers which is teacher-centered. The use of the talk and chalk method of teaching leads to the memorization of facts and concepts, which has not proven to be effective in the performance of secondary school students in the Senior Secondary Certificate Examination (SSCE).

4.0 OBJECTIVES OF THE STUDY

This study investigates the impact of field-trip strategy on performance in ecology among senior secondary students in Katsina State, Nigeria. The objectives of this study are to:

1. determine the effect of the Field-trip strategy on performance in ecology concepts among senior secondary school students in Katsina
2. assess the effect of field-trip strategy on the performance of male and female students taught ecology concepts

4.1 Research Questions

The following research questions are formulated to guide the study:

1. what is the effect of the Field-trip strategy on performance in ecology concepts among senior secondary school students in Katsina
2. What is the effect of field-trip strategy on the performance of male and female students taught ecology concepts?

4.2 Null Hypotheses

The following null hypotheses are formulated to be tested at a $p \leq 0.05$ level of significance:

H01: There is no significant difference in the mean scores of students exposed to the field-trip strategy when compared with those taught using the lecture method

H02: There is no significant difference between the mean scores of male and female students taught ecology using the field-trip strategy and those taught using the lecture method.

4.3 Significance of the Study

The findings of this study would hopefully uplift the standard of biology teaching and learning as follows;

Biology Students: Encourage biology students to gain the effectiveness of field-trip strategy in fostering creativity and corporation among students and contribute to the improvement of performance in ecology and the subject biology as a whole.

Biology Teachers: Enlightened on the effectiveness of field-trip strategy alongside lecture method on students' performance thereby the need for applying the most effective method to substitute traditional method.

Researchers: Could also provide empirical evidence and a foundation for further research in the study in relation to teaching and learning strategies suitable for teaching biology using the field-trip strategy at senior secondary school level.

Curriculum Planners: Provide information for better comprehension of how ecology should be presented and taught to learners using field-trip strategies.

Professional Bodies: The findings will hopefully be useful to various agencies such as; the Science Teachers Association of Nigeria (STAN) and the findings will add new knowledge to existing literature and can be the foundation for further studies.

Textbook Publishers: The study would benefit publishers to design activities that involve field-trip strategy to aid meaningful learning among students.

Education Agencies and Parastatals: Assist educational agencies such as the Quality Assurance Agency and the Mass Literacy Boards to organize workshops or training for science teachers on the need to adopt field-trip strategies in teaching science concepts to students

5.0 RESEARCH DESIGN

The research design for this study is a quasi-experimental design involving pretest, posttest, experimental, and control groups as described by Kerlinger (1973). There are two groups of students in the study; one experimental group (EG) and one control group (CG), the experimental group was taught ecology concepts of SS II biology using a field-trip strategy. The students in the control group (CG) were taught the same concepts using the lecture method for a period of six weeks.

5.1 The population of the Study

The population of this study consisted of all the nine (9) co-education Senior Secondary School Students in Katsina Education Zone, Katsina State, Nigeria. The total number of SS II students from the nine schools is one thousand one hundred and sixty-four (1,164), of which

seven hundred and ninety-two (792) are males and three hundred and seventy-two (372) are females.

5.2 Sample and Sampling Technique

Two schools were randomly selected from the population having a total number of 345 SS II biology students who constitute the sample of the study.

5.3 Instrumentation

The research instrument developed by the researcher for the purpose of data collection is:

a) Ecology Performance Test (EPT)

5.4 Validation of the Instruments

The research instrument was validated by three senior lecturers from the Department of Science Education, Ahmadu Bello University, Zaria with a minimum qualification of Ph.D. the instrument was also pilot tested.

5.5 Reliability of the Instrument

The reliability of the Ecology Performance Test (EPT) was 0.89

5.6 Administration of Treatments

The experimental group was exposed to the constructivist method of instruction based on a field-trip strategy for a period of six weeks. The treatment was administered to the subjects by the researcher. This was carried out by teaching ecology concepts using a field-trip strategy that involved taking the class outside the confines of a classroom, which allows the students to achieve specific objectives, which could not be achieved efficiently in the classroom.

5.7 Procedure for Data Analysis

The research questions were analyzed using descriptive statistics of mean, standard deviation, and mean difference while the hypothesis was tested using a t-test.

6.0 RESULTS AND DISCUSSION

Answering Research Questions:

Question One: What is the difference between the mean scores of students taught ecology concepts using the field-trip strategy when compared with those taught using the lecture method?

Table 1: Performance Mean scores of students taught ecology concepts using field-trip strategy when compared with those taught using the lecture method

Variable	N	Mean	Std. Dev.	Mean Difference
Field trip Strategy	134	30.99	3.41	7.46
Lecture Method	78	23.54	3.41	

Results of the descriptive statistics in Table 1 showed that a wide difference exists between the mean scores of students taught ecology concepts field-trip strategy when compared with those taught using the lecture method. Their descriptive statistics show the mean of 30.99 and 23.54 by students taught ecology concepts using field-trip strategy when compared with those taught using the lecture method respectively. A mean difference of 7.46 was found between the field-trip group and the Control Group.

Question Two: What is the difference in the mean scores of male and female students taught ecology using field-trip strategy and those taught using the lecture method?

Table 2: Mean Scores of Male and Female Students taught Ecology using Field-Trip Strategy and those taught using Lecture Method

Study Groups	N	Mean	Std. Deviation	Mean Difference
Male (Field trip)	92	30.85	3.39	0.45
Female (Field trip)	42	31.30	3.49	
Male (Lecture)	51	23.41	3.34	0.37
Female (Lecture)	27	23.78	3.58	

The results of the descriptive statistics in Table 2 showed that there is no difference between the mean scores of male and female students taught ecology using the field trip strategy and those taught using the lecture method. The descriptive statistics showed that Among the Field trip strategy group, the male and female scores were 30.85 and 31.30 respectively with a mean difference of 0.45 between them. In the same vein among the control group, the male and female scores were 23.41 and 23.78 respectively with a mean difference of 0.37 between them.

Test of Null Hypotheses

Ho1: There is no significant difference between the mean scores of students taught ecology using collaborative strategy and their counterparts taught using field-trip strategy.

Hypothesis One: there is no significant difference among the mean scores of students exposed to the field-trip strategy when compared with those taught using the lecture method.

Table 3: Independent Sampled t-test Statistics of Students taught using Field-Trip Strategy and Lecture Method

Variable	N	Mean	Mean Difference	p-value
Field trip Strategy	134	30.99	7.4	0.04

Lecture Method	78	23.54		
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Results of the Independent Sampled t-test Statistics result in Table 3 showed that a significant difference exists between the of students taught ecology concepts using field-trip strategy and those taught using the lecture method. This is because the p-value of 0.04 is lower than the 0.05 alpha level of significance. This shows that students in the experimental groups have significantly higher mean performance compared with those in the control group that have significantly lower mean performance. Therefore the null hypothesis which stated that there is no significant difference between the anxiety level of students taught ecology concepts using the field-trip strategy and those taught using the lecture method, is hereby rejected in favor of the field-trip strategy.

Hypothesis Two: There is no significant difference between the mean scores of male and female students taught ecology using the field-trip strategy and those taught using the lecture method.

Table 4: Analysis of Covariance (ANOVA) Statistic on Difference between the Mean Scores of Male and Female Students taught Ecology using Field-Trip Strategy and those taught using Lecture Method

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Remark
Corrected Model	2744.830 ^a	3	914.94	78.16	0.00	Sig.
Intercept	130898.160	1	130898.16	11181.82	0.00	Sig.
Gender	7.288	1	7.29	0.62	0.43	N.S
Groups	2449.292	1	2449.29	209.23	0.00	Sig.
Gender * Groups	.077	1	0.08	0.01	0.94	N.S.
Error	2434.919	208	11.71			
Total	174340.750	212				
Corrected Total	5179.749	211				
a. R Squared = .530 (Adjusted R Squared = .523)						

The results of the Analysis of Covariance statistics are in Table 4. Showed that there is no significant difference between the mean scores of male and female students taught ecology using the field-trip strategy and those taught using the lecture method. The reason is that in the Groups vs gender the calculated p-value of 0.94 is greater than the 0.05 alpha level of significance. This clearly showed that the field-trip strategy significantly improved the academic performance of both male and female students in Ecology concepts among secondary school biology students in Katsina State, Nigeria. Therefore the null hypothesis which stated that there is no significant difference between the mean scores of male and female students taught ecology using field-trip strategy and those taught using the lecture method is hereby accepted and retained.

7.0 CONCLUSIONS

Based on the findings, it was concluded that the field trip strategy has a significant and positive effect on students' mean performance and it is gender-friendly among senior secondary students in Katsina State, Nigeria.

8.0 RECOMMENDATIONS

On the basis of the outcome of the research findings, the following recommendations were made:

1. Biology teachers in public secondary schools should be encouraged through sponsorship to attend seminars and workshops and if possible sponsored for further studies on how to effectively utilize teaching strategies that are students centered.
2. Students should be encouraged to avail themselves during field-trip so as to have firsthand information and experience from the environment which could boost academic performance.

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